

MEMORANDUM

TO: **FILE – DENISON MINES – WHITE MESA MILL**

THROUGH: Jay Morris, Minor Source Compliance Section Manager *JM*

FROM: Sarah Malluche, Environmental Scientist *SM*

DATE: April 3, 2014

SUBJECT: PCE, Minor, San Juan County, AIRS #037-00017

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REVIEW DATE: April 3, 2014

SOURCE LOCATION: White Mesa Mill, San Juan County, Utah

SOURCE CONTACT(S): Jaime Massey, Regulatory Compliance Specialist  
303-389-4167

OPERATING STATUS: Operating

PROCESS DESCRIPTION: Underground Uranium mine

APPLICABLE REGULATIONS: AO dated 3/2/11 (DAQE-AN0112050018-11), NESHAP Part 61, Subpart W

SOURCE INSPECTION EVALUATION: NESHAP Part 61 Subpart W Annual Report

61.252 Standard

(a) Radon-222 emissions to the ambient air from an existing uranium mill tailings pile shall not exceed 20 pCi m<sup>2</sup> –s of radon-222.

Status: In violation. The annual report indicated that Cell #2 exceed the 20 pCi m<sup>2</sup> –s of radon-222 in 2013. Nine readings were averaged (from April – December 2013) and calculated to be 20.4 pCi m<sup>2</sup> –s of radon-222. The reporting requirements for an exceedance are for the source to begin monthly monitoring.

61.254 Annual Reporting Requirements

(a)(1-3) owners or operators of operating existing mill impoundments shall report the results of the compliance calculations in Section 61.253 and the input parameters used in making the calculations. This report shall be sent to EPA by March 31 of the following year.

Status: In compliance. The report was received on March 28, 2014. The annual calculations and the results of the report are on page 2 of the report.

(a)(1-3) Each reports shall contain the following information:

- (1) name and location of mill.

Document Date 4/3/2014



Status: In compliance. White Mesa Mill is located 6 miles south of Blanding, in San Juan County, Utah.  
(2) persons responsible for operations, and report preparation.

Status: In compliance. David Frydenlund, Senior VP General Counsel and Corporate Secretary, is the responsible person for operations, and Jaime Massey, Regulatory Compliance Specialist, was responsible for the prepared report.

(3) results of testing conducted, including the results of each measurement.

Status: In compliance. The reported results for the radon-222 flux monitoring for the cell 2 tailing cell is 20.4 pCi m<sup>2</sup> -s for 2013. Cell 2 indicates an exceedance (>20 pCi m<sup>2</sup> -s).

(4) each report shall be signed and dated by a corporate officer...

Status: In compliance. David Frydenlund signed the report and dated the report on March 27, 2014.

(b)(1-2) if the facility is not in compliance with the emission limits of 61.252 in the calendar year covered by the report, then the facility must commence reporting to the Administrator on a monthly basis the information listed in 61.254 (a)(1-4) for the preceding month.

Status: Applicable. Due to the exceedance from Cell #2, monthly reports are required to be submitted. Reports have been required since April 2013 and will continue to be required.

(c) first report will cover the emission of calendar year 1990.

Status: Not applicable. Facility did not operate the mine during the calendar year of 1990.

EMISSION INVENTORY: 2012 inventory submitted the following information in tons/year:

CO:	10.71	Formaldehyde:	0.00745
NOX:	13.89	PM10:	0.98
PM2.5:	0.98	SOX:	0.7
VOC:	1.55		

PREVIOUS ENFORCEMENT ACTIONS:

Warning issued on 2/10/12 DAQC-157-12 for failing to include the certification statement on annual reports for 2008-2010. Denison Mines submitted the certification statement for the years 2008-2010 on 2/14/12.

Warning issued on 3/19/12 DAQC-282-12 for failing to meet emission standards from 11/26/11 through 12/12/11. The operator work procedures that caused the violation were addressed in correspondence on 12/27/11.

COMPLIANCE STATUS & RECOMMENDATIONS:

The facility is in compliance with the annual reporting requirements. Monthly reporting is required due to Cell 2 exceedance. Monthly monitoring will be conducted until Cell 2 is within the NESHAP limit of 20 pCi m<sup>2</sup> -s.

RECOMMENDATION FOR NEXT INSPECTION:

None.

ATTACHMENTS:

3/28/14 White Mesa Mill Annual Report



Energy Fuels Resources (USA) Inc.  
225 Union Blvd. Suite 600  
Lakewood, CO. US, 80228  
303 974 2140  
[www.energyfuels.com](http://www.energyfuels.com)

## VIA EMAIL AND OVERNIGHT DELIVERY

March 27, 2014

Mr. Bryce Bird  
Director, Utah Division of Air Quality  
State of Utah Department of Environmental Quality  
195 North 1950 West  
Salt Lake City, UT 84116

UTAH DEPARTMENT OF  
ENVIRONMENTAL QUALITY

MAR 28 2014

DIVISION OF AIR QUALITY

**Re: White Mesa Uranium Mill,  
National Emissions Standards for Radon Emission from Operating Mill Tailings  
Transmittal of 2013 Annual Radon Flux Monitoring Report for Tailings Impoundment 2**

Dear Mr. Bird:

This letter transmits Energy Fuels Resources (USA) Inc.'s ("EFRI's") radon-222 flux annual monitoring report for 2013, consistent with 40 CFR 61.254(b), for tailings impoundment 2 ("Cell 2") at the White Mesa Uranium Mill (the "Mill"). As discussed in our 2012 Annual Radon Flux Monitoring Report submitted March 29, 2013, the radon flux from Cell 2 during 2012 was higher than the 20 pCi/(m<sup>2</sup> -sec) set out in 40 CFR 61.252(a). Although Cell 2 is no longer in operation, consistent with 40 CFR 61.254b, EFRI chose to perform monthly radon flux monitoring beginning the month immediately following submittal of the report for the year in non-compliance. Monthly sampling for Cell 2 was conducted from April through December 2013.

The result of the 2013 radon-222 flux monitoring for Cell 2 was 20.4 pCi/(m<sup>2</sup> -sec) (averaged over 9 monthly sampling events), which exceeds the 20 pCi/(m<sup>2</sup> -sec) set out in 40 CFR 61.252(a) for the year. Although, based on the monthly sampling results, radon flux for Cell 2 was lower than 20 pCi/(m<sup>2</sup> -sec) since September of 2013 and has remained below 20 pCi/(m<sup>2</sup> -sec) since that time.

The results of the 2013 monthly sampling events are included as Table 1 to the attached report. Additionally, a summary of the events that gave rise to EFRI's decision to monitor radon flux at Cell 2 monthly consistent with 40 CFR 61.254(b) is set out in the attached report.

Please contact me at 303-389-4167 should you have any questions or need additional information.

Sincerely,

A handwritten signature in black ink, appearing to read "JAIME MASSEY".

**ENERGY FUELS RESOURCES (USA) INC.**

Jaime Massey  
Regulatory Compliance Specialist

Letter to B. Bird

March 27, 2014

Page 2 of 2

cc: David C. Frydenlund  
Phil Goble, Utah DRC  
Dan Hillsten  
Rusty Lundberg, Utah DRC  
Jay Morris, Utah DAQ  
Harold R. Roberts  
David E. Turk  
Kathy Weinel  
Frank Filas  
Director, Air and Toxics Technical Enforcement Program, Office of Enforcement, Compliance  
and Environmental Justice, U. S. Environmental Protection Agency

Attachments

**ENERGY FUELS RESOURCES (USA) INC.  
40 CODE OF FEDERAL REGULATIONS 61 SUBPART W**

**WHITE MESA MILL  
SAN JUAN COUNTY, UTAH**

**TAILINGS CELL 2 ANNUAL COMPLIANCE REPORT FOR 2013**

**Submitted March 27, 2014**

**by**

**Energy Fuels Resources (USA) Inc.  
225 Union Blvd. Suite 600  
Lakewood, Colorado 80228  
(303) 974-2140**

## **1) Name and Location of the Facility**

Energy Fuels Resources (USA) Inc. (“EFRI”) operates the White Mesa Mill (the “Mill”), located in central San Juan County, Utah, approximately 6 miles (9.5 km) south of the city of Blanding. The Mill can be reached by private road, approximately 0.5 miles west of Utah State Highway 191. Within San Juan County, the Mill is located on fee land and mill site claims, covering approximately 5,415 acres, encompassing all or part of Sections 21, 22, 27, 28, 29, 32, and 33 of T37S, R22E, and Sections 4, 5, 6, 8, 9, and 16 of T38S, R22E, Salt Lake Base and Meridian.

All operations authorized by the Mill’s State of Utah Radioactive Materials License are conducted within the confines of the existing site boundary. The milling facility currently occupies approximately 50 acres and the tailings disposal cells encompass another 275 acres.

## **2) 2013 Annual Report**

As discussed in our 2012 Annual Radon Flux Monitoring Report submitted March 29, 2013, the radon flux from Cell 2 during 2012 was higher than the 20 pCi/(m<sup>2</sup> -sec) set out in 40 CFR 61.252(a). Although Cell 2 is no longer in operation, consistent with 40 CFR 61.254b, EFRI chose to perform monthly radon flux monitoring beginning the month immediately following submittal of the report for the year in non-compliance. Monthly sampling for Cell 2 was conducted from April through December 2013.

Although Cell 2 is no longer in operation, this report is being submitted as the annual report for the Mill’s Cell 2 in 2013, consistent with 40 CFR 61.254(b) applicable to operating tailings impoundments. The result of the 2013 radon-222 flux monitoring for Cell 2 was 20.4 pCi/(m<sup>2</sup> -sec) (averaged over 9 monthly sampling events), which exceeds the 20 pCi/(m<sup>2</sup> -sec) set out in 40 CFR 61.252(a). Although, based on the monthly sampling results, radon flux for Cell 2 was lower than 20 pCi/(m<sup>2</sup> -sec) since September of 2013 and has remained below 20 pCi/(m<sup>2</sup> -sec) since that time.

EFRI submitted monthly reports from May 2013 through January 2014 summarizing the April 2013 through December 2013 monthly sampling at Cell 2. These reports included the Radon Flux Measurement Program Reports, prepared by Telco Environment Inc. (the “Telco Reports”). A summary of the results of the Telco reports, as well as, the date the EFRI monthly reports were submitted to the Utah Division of Air Quality (“DAQ”) is included as Table 1 to this report. The complete Telco reports are attached to the individual monthly reports shown on Table 1. A summary of the events that gave rise to EFRI’s decision to monitor radon flux at Cell 2 monthly consistent with 40 CFR 61.254(b) is set out below.

## **3) Name of the Person Responsible for Operation and Preparer of Report**

Energy Fuels Resources (USA) Inc.  
225 Union Boulevard, Suite 600  
Lakewood, Colorado 80228  
303.628.7798 (phone)  
303.389.4125 (fax)

EFRI is the operator of the Mill and its tailings impoundments (Cells 2, 3, and 4A) and evaporation impoundments (Cells 1 and 4B). The Mill is an operating conventional uranium mill, processing both conventional ores and alternate feed materials. The “method of operations” at the Mill is phased disposal of tailings. The annual radon emissions for existing impoundments are measured using Large Area Activated Charcoal Canisters in conformance with 40 CFR, Part 61, Appendix B, Method 115, Restrictions to Radon Flux Measurements, (Environmental Protection Agency [“EPA”], 2008). These

canisters are passive gas adsorption sampling devices used to determine the flux rate of Radon-222 gas from the surface of the tailings material. For impoundments licensed for use after December 15, 1989 (i.e., Cell 4A, and 4B), EFRI employs the work practice standard listed at 40 CFR 61.252(b)(1) in that all tailings impoundments constructed or licensed after that date are lined, are no more than 40 acres in area, and no more than two impoundments are operated for tailings disposal at any one time.

#### **4) Background Information -- Summary of 2012 Annual Report**

##### **Facility History**

Cells 2 and 3, which have surface areas of 270,624 m<sup>2</sup> (approximately 66 acres) and 288,858 m<sup>2</sup> (approximately 71 acres), respectively, were constructed prior to December 15, 1989 and are considered “existing impoundments” as defined in 40 CFR 61.251. Radon flux from Cells 2 and 3 is monitored annually, as discussed below.

Cells 4A and 4B were constructed after December 15, 1989, and are subject to the work practice standards in 40 CFR 61.252(b)(1), which require that the maximum surface area of each cell not exceed 40 acres. For this reason, Cells 4A and 4B are not required to undergo annual radon flux monitoring.

Cell 3, which is nearly filled, and Cell 4A, receive the Mill’s tailings sands. Cells 1 and 4B, receive solutions only, and are in operation as evaporation ponds. Cell 2 is filled with tailings, is covered with an interim soil cover, and is no longer in operation.

##### **Dewatering of Cell 2**

The Utah Division of Water Quality issued Groundwater Discharge Permit (“GWDP”) UGW-370004 in 2005. Under Part I.D.3 of the current GWDP, EFRI has been required to accelerate dewatering of the solutions in the Cell 2 slimes drain. Dewatering of Cell 2 began in 2008. In mid-2011, changes were made in the pumping procedures for slimes drain dewatering of Cell 2 that resulted in an acceleration of dewatering since that time. As discussed in more detail below, studies performed by EFRI indicate that the increase in radon flux from Cell 2 has likely been caused by these dewatering activities. No other changes appear to have occurred in condition, use, or monitoring of Cell 2 that could have resulted in an increase in radon flux from the cell.

The average water level in the Cell 2 slimes drain standpipe for each of the years 2008 through 2013 indicate that water levels in Cell 2 have decreased approximately 3.98 feet (5600.56 to 5596.58 fmsl) since 2008. Of this decrease in water level, approximately 1 foot occurred between 2010 and 2011, reflecting the improved dewatering that commenced part way through 2011, and approximately 2 feet between 2011 and 2013, reflecting improved dewatering for all of 2012 and 2013.

##### **Radon Flux Monitoring of Cell 2**

Tellco performed the 2012 radon flux sampling during the second quarter of 2012 in the month of June. On June 25, 2012, Tellco advised EFRI that the average radon flux for Cell 2 from samples taken in June 2012 was 23.1 pCi/(m<sup>2</sup> -sec) (referred to in the Tellco report as pCi/m<sup>2</sup>-s), which was higher than the 20 pCi/(m<sup>2</sup> -sec) standard referred to in 40 CFR 61.252(a).

40 CFR 61.253 provides that:

"When measurements are to be made over a one year period, EPA shall be provided with a schedule of the measurement frequency to be used. The schedule may be submitted to EPA prior to or after the first measurement period."

EFRI advised DAQ by notices submitted on August 3 and September 14, 2012, that EFRI planned to collect additional samples from Cell 2 in the third and fourth quarters of 2012. These samples were collected on September 9, October 21, and November 21, 2012, respectively. As the June 2012 monitoring for Cell 3 indicated that it was in compliance with the standard, further monitoring of Cell 3 was not performed.

The result of the 2012 radon-222 flux monitoring for Cell 2 was 25.9 pCi/(m<sup>2</sup> -sec) (averaged over four monitoring events). The measured radon flux from Cell 2 in 2012 was therefore higher than the standard of 20 pCi/(m<sup>2</sup> -sec) referred to in 40 CFR 61.252(a).

The Cell 2 radon flux results were reported in EFRI's 2012 Annual Radon Flux Monitoring Report (the "2012 Annual Report").

The provisions of 40 CFR 61.254(b) requires that:

"If the facility is not in compliance with the emission limits of paragraph 61.252 in the calendar year covered by the report, then the facility must commence reporting to the Administrator on a monthly basis the information listed in paragraph (a) of this section, for the preceding month. These reports will start the month immediately following the submittal of the annual report for the year in non-compliance and will be due 30 days following the end of each month."

Monthly monitoring in 2014 has and will continue until US EPA or DAQ advises EFRI that such monthly monitoring need not be continued.

### **Evaluation of Potential Factors Affecting Radon Flux**

In an attempt to identify the cause of the increase in radon flux at Cell 2, EFRI conducted a number of evaluations in 2013, including:

- Excavation of a series of 10 test pits in the Cell 2 sands to collect additional information needed to ascertain factors affecting radon flow path and flux,
- Evaluation of radon trends relative to slimes drain dewatering,
- Development of correlation factors relating dewatering rates to radon flux, and
- Estimation of the thickness of temporary cover that would be required to reduce radon flux to levels lower than 20 pCi/(m<sup>2</sup> -sec), during the dewatering process.

These studies and results are discussed in detail in EFRI's 2012 Annual Radon Flux Report and summarized in the remainder of this section.

Slimes drain dewatering data indicate that a lowering of the water level in Cell 2 has resulted in an increase in the average radon flux, and that an increase in water level has resulted in a decrease in the average radon flux. Changes in radon flux have consistently been inversely proportional to changes in water levels in Cell 2 since 2008. For the last three years the change in radon flux has been between 3 and 5 pCi/(m<sup>2</sup> -sec) per each foot of change in water level. It is also noteworthy that the significant

increases in radon flux from Cell 2 which occurred between 2010 and 2011 and between 2011 and 2012 coincided with the periods of improved (accelerated) dewatering of Cell 2.

EFRI has evaluated these results and has concluded that the increase in radon-222 flux from Cell 2 in excess of 20 pCi/(m<sup>2</sup>-sec) is most likely the unavoidable result of Cell 2 dewatering activities mandated by the Mill's State of Utah GWDP. This is due to the fact that saturated tailings sands attenuate radon flux more than dry tailings sands, and the thickness of saturated tailings sands decrease as dewatering progresses. There appear to have been no other changes in conditions at Cell 2 that could have caused this increase in radon flux from Cell 2. These conclusions are supported by evaluations performed by SENES Consultants Limited ("SENES"), who were retained by EFRI to assess the potential effects of dewatering on the radon flux from Cell 2 and to provide calculations of the thickness of temporary cover required to achieve the radon flux standard during the dewatering process.

SENES' evaluations were presented in a report provided as an attachment to EFRI's 2012 Annual Report. SENES estimated a theoretical radon flux from the covered tailings at Cell 2 for various depths (thicknesses) of dry tailings, and predicted future increases in radon flux as a function of decreases in water levels.

In order to explore potential interim actions that could be taken to maintain radon flux at levels at or below 20 pCi/(m<sup>2</sup>-sec), the SENES study also evaluated the extent to which radon emanations from the cell can be reduced by increasing the thickness of the current interim cover on Cell 2.

## **5) 2013 Annual Results**

Detailed results for the April through December 2013 monthly sampling events are contained in the Tellco Reports, which are provided as Attachment 1 to the monthly reports. As described in the Tellco Reports, monitoring was performed consistent with 40 CFR 61 Subpart W Appendix B, Method 115 radon emissions reporting requirements. The radon monitoring consisted of 100 separate monitoring points at which individual radon flux measurements have been made by collection on carbon canisters. The individual radon flux measurements were averaged to determine whether they exceeded 20 pCi/(m<sup>2</sup>-sec).

The average radon flux for Cell 2 in 2013 was reported by Tellco to be 20.4 pCi/(m<sup>2</sup>-sec).

## **6) Other Information**

### **Status of Proposed Updated Final Cover Design**

As part of developing the Mill's final reclamation plan required to achieve the radon flux standard of 20 pCi/(m<sup>2</sup>-sec), a final engineered cover design was submitted by TITAN Environmental in 1996 and approved by the US Nuclear Regulatory Commission ("NRC"). An updated final cover design for the Mill's tailings system, submitted in November 2011, is under review by the Utah Division of Radiation Control ("DRC"), and is not currently approved. DRC provided a second round of interrogatories on the proposed cover design and associated Infiltration and Contaminant Transport Model ("ICTM") in February 2013, for which EFRI and its consultant, MWH Inc. are preparing responses.

## **7) Additional Information Required for Monthly Reports**

### **a) Controls or Other Changes in Operation of the Facility**

40 CFR 61.254(b)(1) states that in addition to all the information required for an Annual Report under 40

CFR 61.254(b), monthly reports provided under that section shall also include a description of all controls or other changes in operation of the facility that will be or are being installed to bring the facility into compliance.

Based on the evaluations described in Section 4, above, and as discussed during EFRI's March 27, 2013 meeting with DAQ and DRC staff, in addition to the monthly monitoring reported in this Monthly Report, EFRI has performed the following steps to ensure that radon emissions from Cell 2 are kept as low as reasonably achievable and at or below 20 pCi/(m<sup>2</sup>-sec).

### **Construction and Monitoring of Interim Cover Test Area, and Application of Additional Random Fill**

- i. EFRI constructed 12 test areas on Cell 2 to assess the effect of the addition of one foot of additional soil cover. EFRI applied one foot of random fill moistened and compacted by a dozer to 12 circular test areas of approximately 100 to 120 feet in diameter. The total tested area is larger than the single 100 foot by 100 foot area proposed in previous Cell 2 monthly radon flux monitoring reports. Installation of 12 test areas containing the additional 1 foot of compacted soil was completed by August 2, 2013. Wetting and re-compaction of all 12 areas was completed prior to the start of the September 21, 2013 monthly flux monitoring event.
- ii. The radon flux has been monitored monthly at 100 locations on Cell 2, including the 12 test areas, since April 2013.
- iii. The effectiveness of the additional compacted cover at the 12 test areas will be evaluated over the next several months. If the desired reduction (to 20 pCi/(m<sup>2</sup>-sec) or lower) is achieved on the test areas, EFRI will apply additional random fill at 90% compaction, to the remainder of Cell 2, on or before July 1, 2014.

Based on discussions with DRC, EFRI will proceed with the application of cover and will provide a letter to DRC with information demonstrating that the application of soil cover is consistent with the design and QC requirements of the proposed Reclamation Plan, currently under revision, on the understanding that the application of cover will be credited toward the final cover design.

### **Interim Corrective Action**

EFRI has taken the following additional steps to provide interim mitigation of radon flux from Cell 2. EFRI has identified the areas of elevated radon flux associated with known sources of radiological contamination at or near the surface of the cell cover. Specifically:

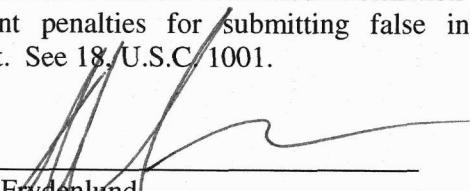
- Windblown tailings from Cell 3 which have been deposited on Cell 2 as Cell 3 is being closed have been removed and re-buried in Cell 3. A berm approximately five feet high, extending the length of the Cell 3 beach has been constructed at the edge of Cell 2, to prevent further carryover of sands from Cell 3 onto the Cell 2 cover prior to closure of Cell 3.
- Any contaminated material near the surface of Cell 2 has been reburied.
- Additional cover material has been added to each of 12 identified areas of elevated flux on Cell 2.
- Monthly radon flux monitoring to assess the effectiveness of the above actions is ongoing.

#### **b) Facility's Performance Under Terms of Judicial or Administrative Enforcement Decree**

The Mill is not under a judicial or administrative enforcement decree.

### **8) Certification**

I Certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. See 18 U.S.C. 1001.

Signed: 

David C. Frydenlund

Senior Vice President, General Counsel and Corporate Secretary

Date: March 27, 2014

**Table 1**

Cell 2 Monthly Radon Flux Sampling		
Sampling Event	Result (pCi/(m <sup>2</sup> -sec))	Monthly Report Submittal Date
April 2013	18.0	May 29, 2013
May 2013	22.6	June 20, 2013
June 2013	23.2	July 25, 2013
July 2013	24.2	August 20, 2013
August 2013	30.2	September 23, 2013
September 2013	17.0	October 23, 2013
October 2013	19.0	November 15, 2013
November 2013	19.5	December 17, 2013
December 2013	10.0	January 15, 2014
<b>2013 Average</b>	<b>20.4</b>	